

Application Number 10/532322
Response to the Office Action dated October 17, 2008

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Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1-32. (Cancelled)

33. (Currently Amended) An organic electrolyte battery separator, which is composed of a nonwoven comprising (a) a heat-and-humidity gelling resin capable of gelling by heating in the presence of moisture and (b) another fiber,

wherein the heat-and-humidity gelling resin is a heat-and-humidity gelling fiber and is made of an ethylene-vinyl alcohol copolymer, an ethylene content of the ethylene-vinyl alcohol copolymer is in a range of 20 mol% to 50 mol%,

the heat-and-humidity gelling fiber has a fiber diameter of 1 to 6 µm,

the other fiber being is fixed with a film gel material obtained by causing made of the heat-and-humidity gelling resin to get in a gel form under heat and humidity and be is pressed and spread by pressing, and

the nonwoven having has a mean flow pore diameter of 0.3 to 5 µm and a bubble point pore diameter of 3 to 20 µm as measured in accordance with ASTM F 316 86.

34. (Currently Amended) The organic electrolyte battery separator according to claim 33, wherein the heat-and-humidity gelling resin is a heat-and-humidity gelling fiber, the heat-and-humidity gelling resin being is provided at least at a portion of a surface of the heat-and-humidity gelling fiber.

35. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein a proportion of the nonwoven occupied by the heat-and-humidity gelling resin is in a range of 10 to 50 mass%.

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36. (Cancelled)

37. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein the other fiber has a fiber diameter of 15 μm or less.

38. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein an average fiber diameter of the other fiber constituting the nonwoven is 10 μm or less.

39. (Currently Amended) The organic electrolyte battery separator according to claim 33, wherein the fiber constituting the other fiber of the nonwoven composed the heat-and-humidity gelling resin and is an olefin fiber.

40. (Currently Amended) The organic electrolyte battery separator according to claim 33, wherein the other fiber includes a high-strength fiber having a single fiber strength of 4.5 cN/dtex or more and the high-strength fiber is included in the nonwoven in a range of 5 to 250 parts by mass where 100 parts by mass of the heat-and-humidity gelling resin is included therein assumed to be 100 parts by mass.

41. (Currently Amended) The organic electrolyte battery separator according to claim 33, wherein the other fiber includes a heat-melting fiber that does not substantially shrink at a temperature that causes the heat-and-humidity gelling resin to gel under heat and humidity to fix the other fiber~~[,]~~ and the heat-melting fiber is included in a range of 10 to 300 parts by mass in the nonwoven where 100 parts by mass of the heat-and-humidity gelling resin is included therein assumed to be 100 parts by mass.

42. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein the nonwoven further comprises a synthetic pulp in addition to the other fiber.

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43. (Currently Amended) The organic electrolyte battery separator according to claim 3342, wherein the synthetic pulp is included in a range of 10 to 200 parts by mass in the nonwoven where 100 parts by mass of the heat-and-humidity gelling resin is included therein assumed to be 100 parts by mass.

44. (Previously Presented) The organic electrolyte battery separator according to claim 34, wherein an average fiber diameter of the heat-and-humidity gelling fiber and the other fiber is 10 μm or less.

45. (Cancelled)

46. (Currently Amended) The organic electrolyte battery separator according to claim [[45]]33, wherein the heat-and-humidity gelling fiber is a fiber provided by splitting a splittable composite fiber that contains the heat-and-humidity gelling resin and the another resin, which are adjacent to each other in a cross-section of the fiber.

47. (Currently Amended) The organic electrolyte battery separator according to claim 46, wherein, when the splittable composite fiber comprising comprised of the heat-and-humidity gelling resin and the another resin, which are adjacent to each other in a cross-section of the fiber, to be able to provide and providing the heat-and-humidity gelling fiber[[.]] is assumed to be included at 100 parts by mass,

the nonwoven comprises, as the other fiber, a high-strength fiber having a single fiber strength of 4.5 cN/dtex or more in a range of 10 to 200 parts by mass, and

the nonwoven further comprises a heat-melting fiber that does not substantially shrink at a temperature that causes the heat-and-humidity gelling resin to gel under heat and humidity to fix the other fiber, in a range of 10 to 200 parts by mass.

48. (Currently Amended) The organic electrolyte battery separator according to claim 46, wherein, when the splittable composite fiber comprising comprised of the heat-and-

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humidity gelling resin and the another resin, which are adjacent to each other in a cross-section of the fiber, ~~to be able to provide and providing~~ the heat-and-humidity gelling fiber[[],] is assumed to be included at 100 parts by mass,

the nonwoven comprises, as the other fiber, a high-strength fiber having a single fiber strength of 4.5 cN/dtex or more in a range of 6.25 to 120 parts by mass,

the nonwoven further comprises a heat-melting fiber that does not substantially shrink at a temperature that causes the heat-and-humidity gelling resin to gel under heat and humidity to fix the other fiber, in a range of 12.5 to 120 parts by mass, and

the nonwoven further comprises ~~the~~a synthetic pulp in a range of 6.25 to 120 parts by mass.

49. (Currently Amended) The organic electrolyte battery separator according to claim 34, wherin thea fiber constituting the nonwoven is a short fiber having a fiber length in a range of 1 mm to 20 mm, and the nonwoven is a wetlaid nonwoven obtained by a wetlaying process using the short fiber.

50. (Currently Amended) The organic electrolyte battery separator according to claim 49, wherin thea splittable composite fiber that contains the heat-and-humidity gelling resin and the other resin is split during the wetlaying step ~~to and provides~~ a heat-and-humidity gelling fiber, and the heat-and-humidity gelling fiber is substantially uniformly present in the nonwoven.

51. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein a surface of the nonwoven is partially covered with a film gel material.

52. (Previously Presented) The organic electrolyte battery separator according to claim 51, wherein an area proportion of the film gel material with respect to an entire surface of the nonwoven is in a range of 40% to 90%.

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53. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein a contact angle of dechlorinated water dropped on a surface of the nonwoven is 60 degrees or less 5 seconds after dropping of the dechlorinated water.

54. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein the nonwoven has a puncture strength of 2 N or more and a standard deviation of 1.1 N or less.

55. (Previously Presented) The organic electrolyte battery separator according to claim 54, wherein a variation index of the puncture strength of the nonwoven is 0.165 or less, the variation being calculated from the puncture strength and the standard deviation using the following expression:

$$\text{variation index of puncture strength} = \text{standard deviation/puncture strength.}$$

56. (Previously Presented) The organic electrolyte battery separator according to claim 33, wherein the separator has a thickness in a range of 15 μm to 80 μm and the nonwoven has a specific volume in a range of 1.2 cm^3/g to 2.5 cm^3/g .

57. (Cancelled)

58. (Cancelled)

59. (Cancelled)

60. (Cancelled)

61. (Cancelled)

62. (Cancelled)

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63. (Previously Presented) An organic electrolyte battery comprising the separator according to claim 33.